TABLE I.1 ALGORITHMS FOR CONVERTING SEMI-INTEGRATED RADIO FLUX DATA (F_S) TO PEAK PROTON FLUX (J)

FREQUENCY (MHz)	ALGORITHM
1415	$J(>5.2) = \frac{1}{C}(2.97 \times 10^4 \; F_{SW}^{0.243})^2$
2695	$J(>5.2) = \frac{1}{C}(8.63 \times 10^8 \; F_{SW}^{0.513})^2$
4995	$J(>5.2) = \frac{1}{C}(5.97 \times 10^7 \; F_{SW}^{0.453})^2$
8800	$J(>5.2) = \frac{1}{C}(9.12 \times 10^6 \; F_{SW}^{0.406})^2$

TABLE I.2 ALGORITHMS FOR CONVERTING EVENT INTEGRATED RADIO FLUX DATA (F_I) TO PEAK PROTON FLUX (J)

FREQUENCY (MHz)	ALGORITHM
1415	$J(>5.2) = \frac{1}{C}(1.74 \times 10^6 \; F_{IW}^{0.376})^2$
2695	$J(>5.2) = \frac{1}{C}(1.66 \times 10^6 \; F_{IW}^{0.380})^2$
4995	$J(>5.2) = \frac{1}{C}(4.57 \times 10^5 \; F_{IW}^{0.352})^2$
8800	$J(>10) = 3.4 \times 10^{24} \; F_{IJ}^{1.43}$
2800	$J(>5.2) = \frac{1}{C}(0.0116 \; F_{IS}^{0.555})^2$

TABLE I.3 ALGORITHMS FOR CONVERTING INTEGRATED X-RAY FLUX (F_X) TO PEAK PROTON FLUX (J)

SENSOR WAVELENGTH RANGE (ANGSTROMS)	ALGORITHM
1–8	$J(>10) = 2.222 \times 10^3 \; F_{XW}^2$
0.5–4	$J(>10) = 5.555 \times 10^4 \; F_{XW}^2$

NOTES:

1 SFU = 10^{-22} Wm^{-2} Hz^{-1}

1 JOULE = WATT SEC.

F_{SW} DESIGNATES UNITS FOR SEMI-INTEGRATED RADIO DATA AND MUST BE (Wm^{-2} Hz^{-1}) SEC.

F_{IW} DESIGNATES UNITS FOR EVENT INTEGRATED RADIO DATA AND MUST BE (Wm^{-2} Hz^{-1}) SEC.

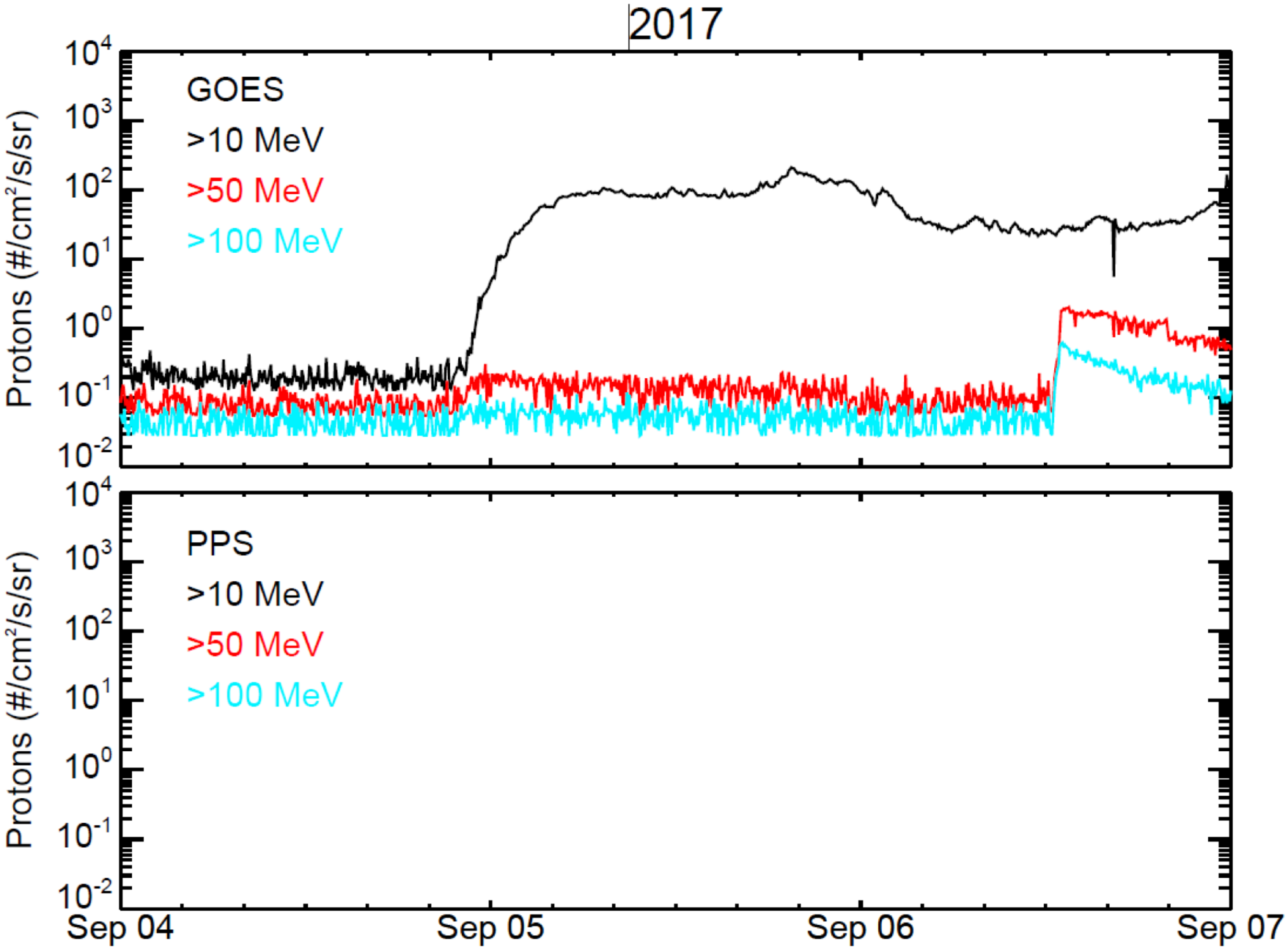
F_{IJ} DESIGNATES UNITS FOR EVENT INTEGRATED RADIO DATA AND AND MUST BE Jm^{-2} Hz^{-1}

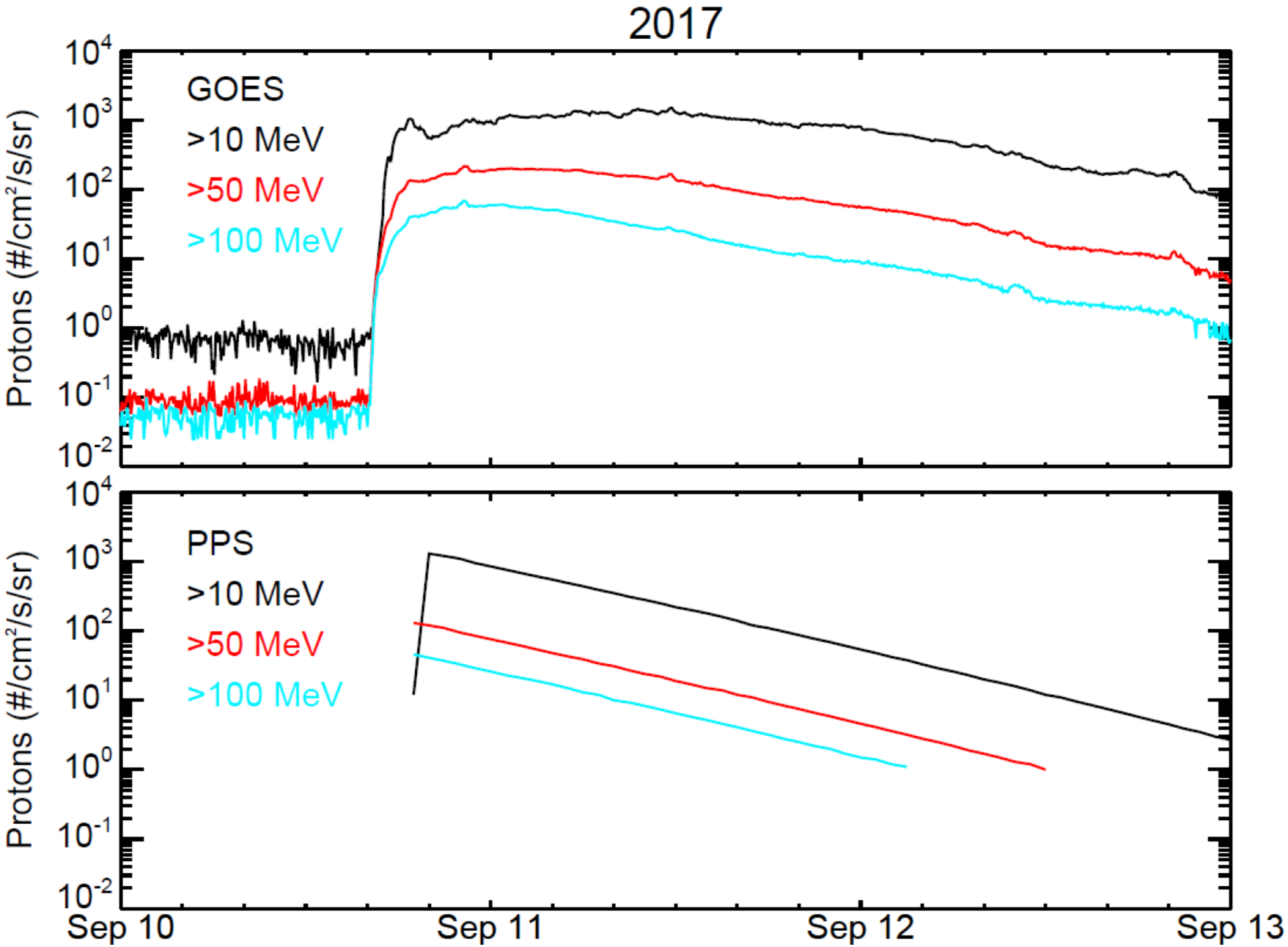
F_{IS} DESIGNATES UNITS FOR EVENT INTEGRATED RADIO DATA AND MUST BE SFU SEC.

F_{XW} DESIGNATES UNITS FOR X-RAY DATA IN UNITS OF Wm^{-2} SEC.

C IS A CONVERSION FACTOR RIOMETER ABSORPTION SQUARED TO >5.2 MeV PROTON FLUX DATA. $C = (0.115)^2 \pi$

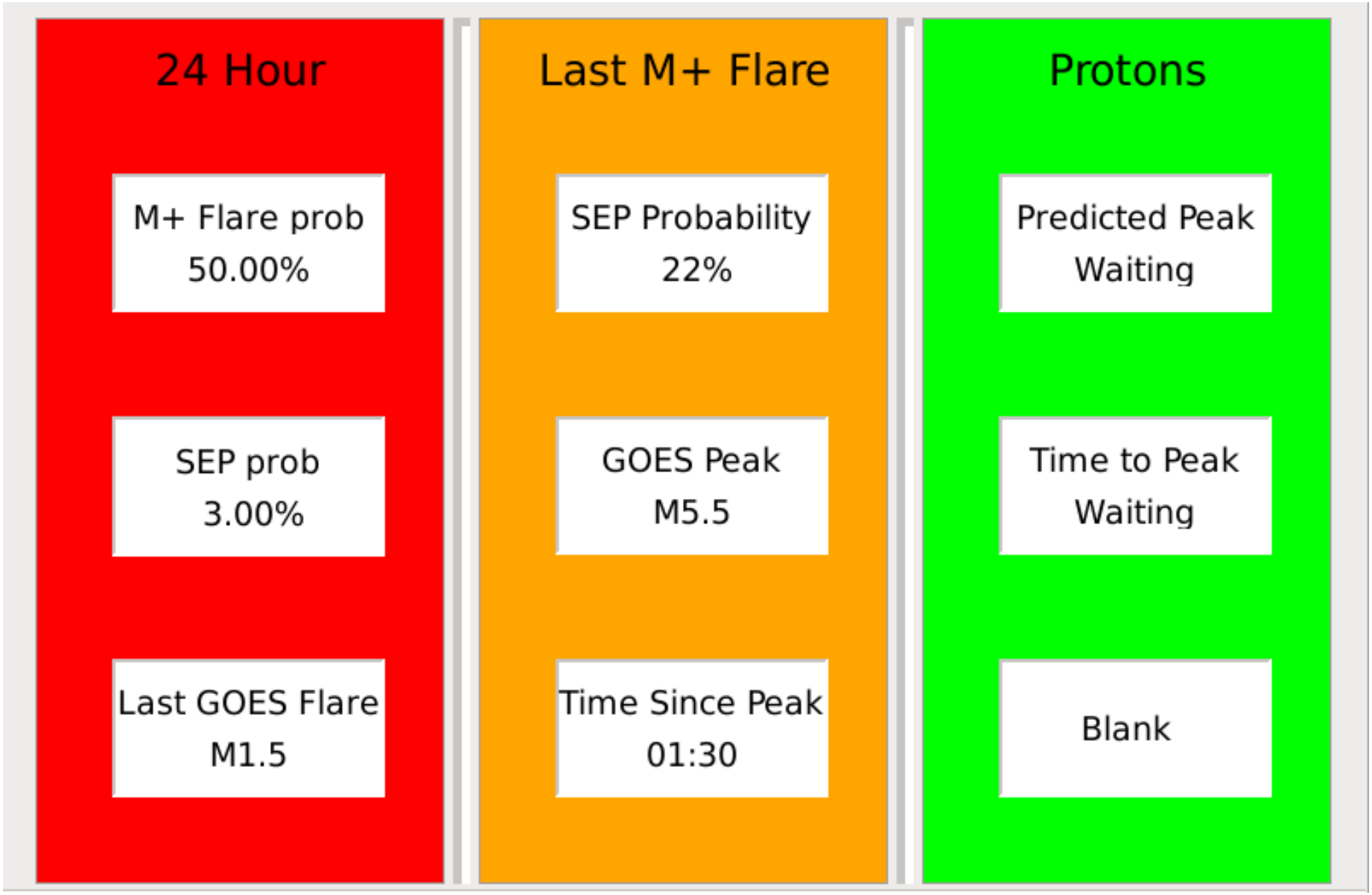
PPS: Smart & Shea (1979, Proc. Solar Terr. Predictions), based on "selected results": start with a maximum possible intensity based on radio flux or fluence or SXR fluence, modify for position, etc.


2017
GOES
>10 MeV
>50 MeV
>100 MeV
Protons (#/cm²/s/sr)
PPS
>10 MeV
>50 MeV
>100 MeV
Protons (#/cm²/s/sr)
Sep 04
Sep 05
Sep 06
Sep 07


2017
GOES
>10 MeV
>50 MeV
>100 MeV
Protons (#/cm²/s/sr)
PPS
>10 MeV
>50 MeV
>100 MeV
Protons (#/cm²/s/sr)
Sep 10
Sep 11
Sep 12
Sep 13

AF Dynamic Energetic Particle Forecasting Tool

Kahler, White, Ling



Kahler & Ling (2017) showed that you can represent SEP light curves as Weibull functions with two parameters:

α = "decay index"

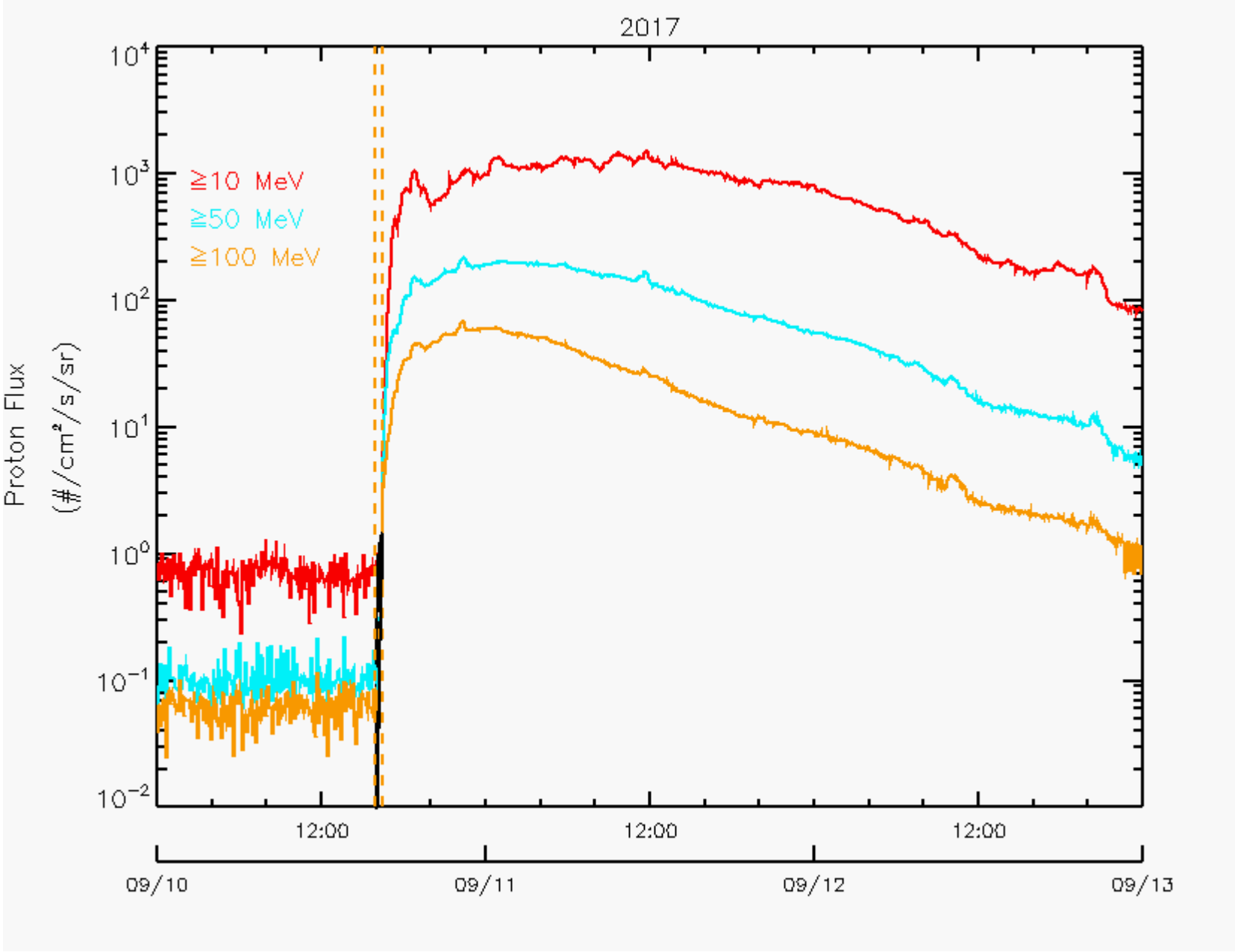
β = timescale

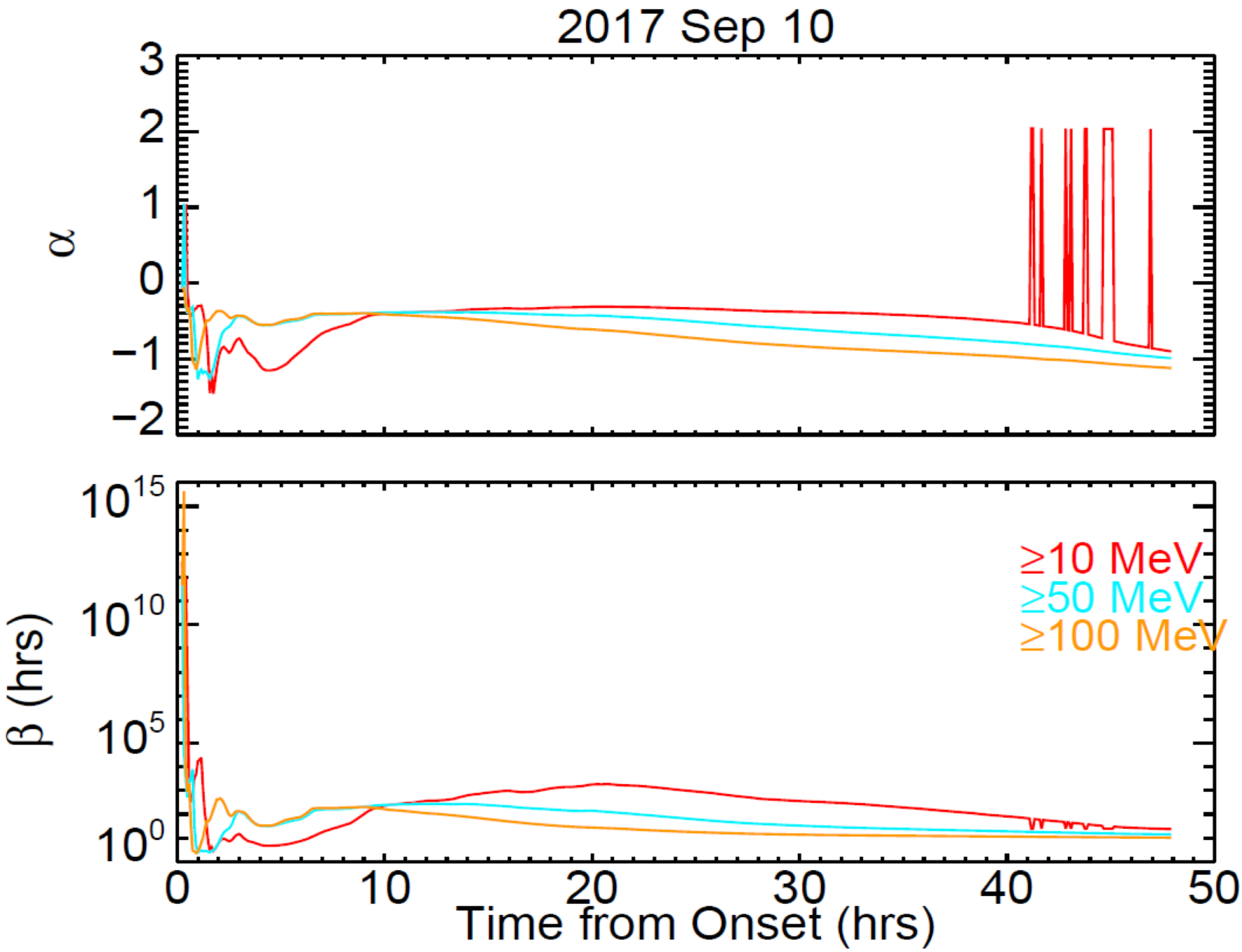
the Weibull function, which is defined as

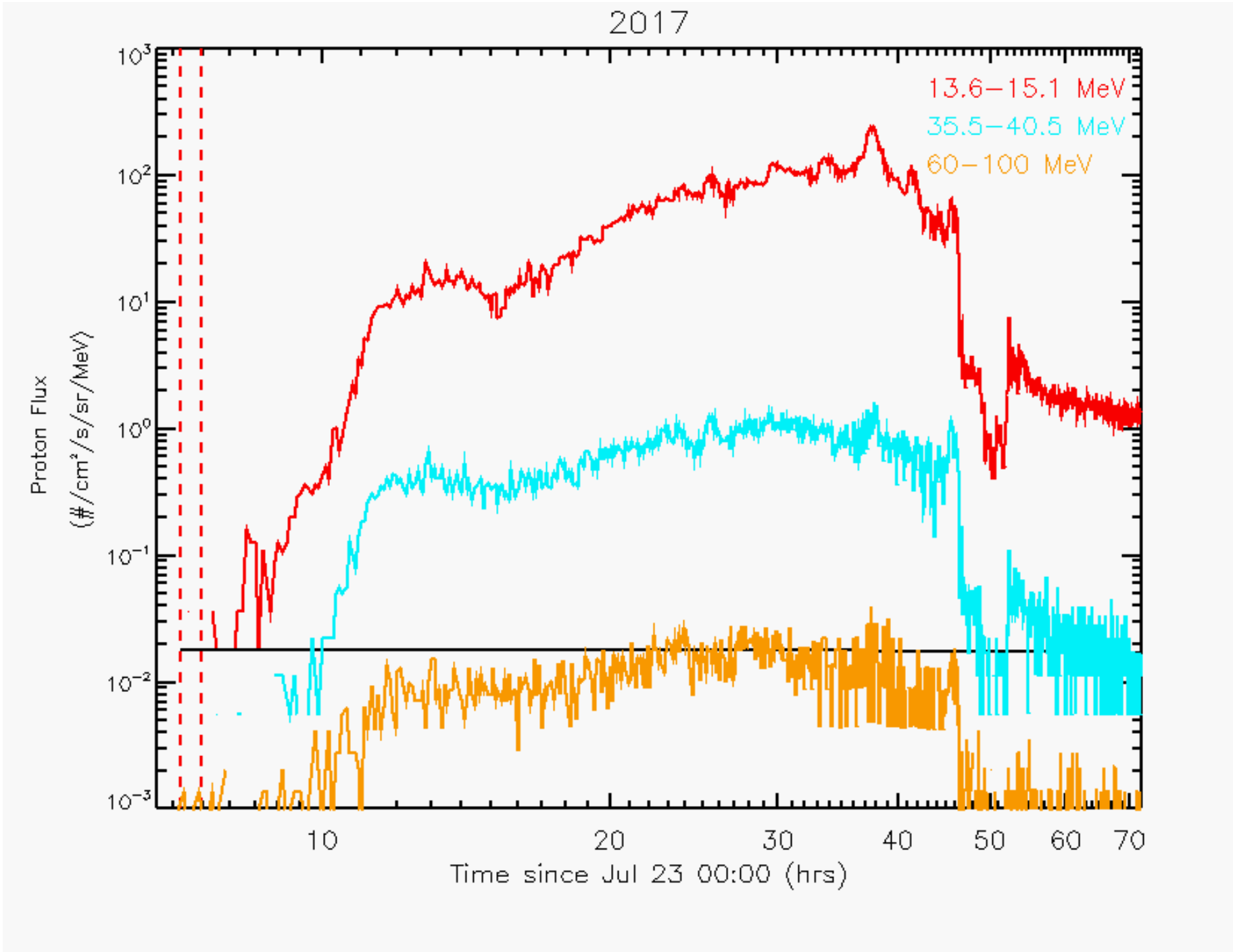
$$f(x) = (\alpha/\beta)(x/\beta)^{\alpha-1}\exp\left[-(x/\beta)^{\alpha}\right],$$

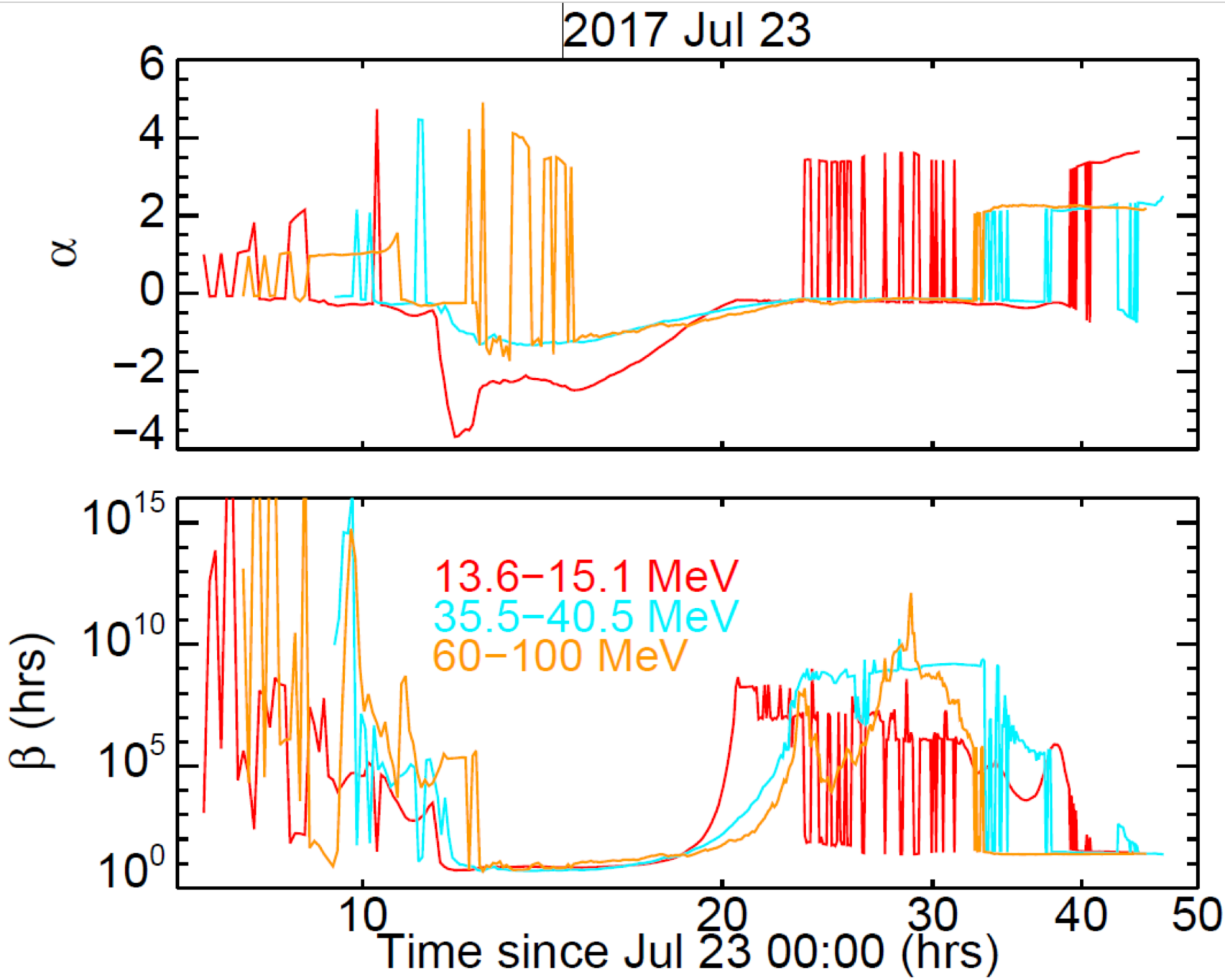
negative values of α, as

$$F(x) = (-\alpha/\beta)(x/\beta)^{\alpha-1}\exp\left[-(x/\beta)^{\alpha}\right],$$


2017
Proton Flux
(#/cm²/s/sr)
≧10 MeV
≧50 MeV
≧100 MeV
10⁴
10³
10²
10¹
10⁰
10⁻¹
10⁻²
12:00
12:00
12:00
09/10
09/11
09/12
09/13


2017 Sep 10
α
β (hrs)
≥10 MeV
≥50 MeV
≥100 MeV
Time from Onset (hrs)


2017
13.6–15.1 MeV
35.5–40.5 MeV
60–100 MeV
Proton Flux
(#/cm²/s/sr/MeV)
10³
10²
10¹
10⁰
10⁻¹
10⁻²
10⁻³
10
20
30
40
50
60
70
Time since Jul 23 00:00 (hrs)


2017 Jul 23
α
6
4
2
0
−2
−4
β (hrs)
10^{15}
10^{10}
10^{5}
10^{0}
13.6−15.1 MeV
35.5−40.5 MeV
60−100 MeV
10
20
30
40
50
Time since Jul 23 00:00 (hrs)